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THE
AMERICAN NATURALIST.

VOL. XVII.—*OCTOBER*, 1883.—No. 10.

MAN'S PLACE IN NATURE.

BY W. N. LOCKINGTON.

SPECIALIZATION is not in itself any proof of advance, yet both in the domain of mind and that of organic life the term is constantly used as though it carried with it the idea of progress, instead of, as is the fact, a mingling of advance with retrogression, the upward or downward tendency of which can only be determined by a careful comparison of all the factors.

In all evolution, organic or super-organic, specialization commences at the bottom of the scale, and a higher grade is only attained by a longer continuance in a generalized condition before specialization—a continuance during which, not some special part but the entire organism becomes capable of wider activities. As the upward development proceeds, branches break off, become specialized, and perfect or complete themselves, that is, become incapacitated for further development. The real line of advance is not to be sought for in the specialized offshoot, but in the growing stem from which it parted.

To give examples from the Vertebrata; it is not the highly specialized teleostean fish, such as the perch, that is in the line of advance, but the more generalized ganoids and Dipnoi through which the upward line runs on into the Batrachia; neither is it the highly specialized flying pterodactyl that is in the line of advance from reptile to bird or mammal; nor can the line of mammalian descent be traced through the birds, in which, high though the type is, specialization of some parts, accompanied by atrophy of others, has resulted in organic completeness at a level lower than that which has been reached by the summit of the mammalian stem.

The highest specialization is that based upon perfection of the

greatest number of parts, not upon the great development of one part at the expense of others.

In so far as the cow, pig or horse have lost digits, they have degenerated; in so far as the remaining digits are more perfect than those of the primitive ungulates, they have advanced. As a whole they have departed from the main stem of mammalian growth to become adapted to the requirements of one line of life; by the completeness of their specialization they have sacrificed all adaptability to other lines of life, and must therefore be pronounced to be, by their very specialization, inferior to animals which have retained their five digits, put them to new and varied uses, and developed them all towards perfection. The hand of the gibbon, though but a poor instrument compared with that of man, is incomparably superior to the one-toed limb of the horse, for it can be used to walk, to grasp, to pick up objects that are needed, to bring food to the mouth; while the one toe of the horse, perfect though it is for progress upon hard ground, is for other purposes useless. If this one-toed limb, reached by complete disuse of the other digits, and resulting in incapacity of employment for more than one purpose, is higher than the five-fingered member which we have inherited from our hypothetical simian ancestor, then, by a similar line of argument, is the naturalist who is thoroughly acquainted with the genus *Scarabæus*, or the forms of *Foraminifera*, superior to a Cuvier, a Lamarck or a Darwin.

Completion is one thing, advance another. The horse stands near, probably at, the end of its line. Farther reduction of digits would entail the loss of limbs, and advance in the direction of brain is precluded by the want of an instrument sufficiently generalized and mobile to do the brain's bidding. Let those who maintain that man has not the highest type of limb because he has carried to their fullest perfection the normal mammalian complement of five digits, try to write their arguments with the middle finger only.

In the same way the folded teeth of the ungulates, though unquestionably more perfect teeth than the simple tubercular teeth of man, are indicative, not of an advance, not of a widening of the powers of nutrition, but of a narrowing of those powers to a special class of foods—a limitation which of itself precludes advance in other directions.

Strangest of all arguments in proof of man's structural inferiority is that which declares the upright face to be inferior to the projecting snout, only for the reason that in the embryo the face is formed beneath the fore-brain, a position permanently retained in man. "The projecting snout," says Dr. Minot,¹ "is a higher structure than the retreating human face." So be it; the baboon has more of this higher structure than we have, the ant-eater excels the baboon, and the pipe fish and gar fish are ahead of both. Let us bow the knee before our superiors.

The persistence of an embryonal character is not of itself any proof of degradation, and when the lack of the brute snout is correlated with a high development of brain, it becomes evident that the total is a structural advance.

We need not ask morphologists or embryologists whether man is the highest animal. We have the proof of it every hour before our eyes. His powers of mind are the resultant of his structure, and have enabled him to conquer all other beings in the struggle of life. That animal is highest which possesses the widest range of faculties. This man undoubtedly does; no other animal has the power, by voice or pen, to exaggerate or depreciate its own importance; no other animal can use the powers of nature as he; no other can produce works which are proportionately comparable to his; and if, therefore, morphology or embryology contradict the facts of life, then are those sciences unsafe guides, as they certainly are only partial ones.

But it may reasonably be doubted whether either morphology or embryology sustain the position assumed by some enthusiastic students of those branches of biology.

Assertions of man's animal inferiority are but the result of a too violent reaction against the thoroughly untenable but far from obsolete idea that man does not belong to the animal kingdom at all, but is, by virtue of his soul, a being sublimely above all others upon the earth—a being for whose benefit or pleasure the earth itself, and all organic life upon it, were divinely prepared.

Only a part of man's superiority is morphological, for mental or, as styled by Spencer, super-organic evolution does not enter into the domain of morphology. Yet this mental evolution can only be maintained, and could only have been gained, by the aid of the most varied bodily relations with the outer world—rela-

¹ AMERICAN NATURALIST, 1882, p. 511.

tions which are incompatible with any but the highest existing perfection of bodily structure. Undoubtedly there are many points in which man is inferior to some animals which, as a whole, are structurally his inferiors. He cannot fly like a bird or insect, swim like a whale, climb like a monkey, or run like a horse; his scent is inferior to that of many animals; in power of distant vision birds surpass him; in strength and size he is excelled by many mammals, reptiles and fishes; yet no other animal can be adduced which has so wide a range of bodily faculties. He can walk, he can run, he can swim (when he tries), he can climb; his delicately constructed fingers can pick up the smallest object, can shape the finest work, without having yet lost their power of grasping, pulling and pushing; his ears are susceptible of all the fine tones of harmony; his eye can appreciate the nicest gradations of color; his touch and eye combined can realize the myriad contours of form. Can any other animal furnish such a list of powers?

Amid all this superiority as a whole, man exhibits great incompleteness and imperfection in parts, and this, combined with generalization of organs and faculties, render it highly probable that future ages may witness much further evolution, both in the direction of the specialization and fixation of characters in derivative species and in the wider range of powers possessed by the uncrystallized remainder.

Already the term man includes several forms which are as much "species" as those so called by the naturalists, though popular prejudice will not recognize the fact. The Chinese and the Ethiopian are as distinct from the Aryan as are the wolf and jackal from the dog, and within our own nationality differences exist which, as pointed out by Professor Cope,¹ would rank as generic were they not prevented from becoming so by the intermarriage of those which possess them with those who do not.

Man in his present condition possesses a body in which the primitive mammalian type has been carried to great perfection without that corresponding degradation by loss of parts which has fixed so many creatures in an inferior position, yet as the general tendency of organic life is toward specialization in some one direction, it is likely that in the future there will split off from

¹ Genera of Felidæ and Canidæ, p. 27, Proceedings of the Academy of Natural Sciences of Philadelphia, 1879.

the human stem species that have aborted some parts, as for example, some of the digits of the foot, or the hindermost molars. Such species will be nearer completion and less capable of further advance; their mental growth as well as their bodily development will be to some extent arrested by the abortion of the parts. If, on the other hand, a portion of the descendants of existing humanity acquire the power of using their feet to perform one set of delicate offices in obedience to the orders of the brain while the hands perform another set, and of using right or left limbs equally well, a vast increase of mental power will be the concomitant of such an acquisition. In many other directions there are possibilities, the eye may gain a power of adjustment that will convert it into microscope and telescope, the ear become ably to close itself at will as is the eye, the touch become far finer than it is now in those most sensitive.

Certain it is, at any rate, that a wide range of physical capabilities is essential to high mental development. The Houyhnhym reads well in Gulliver's Travels, but an animal whose limbs are degraded to a line of levers can never advance mentally. Mind is an animal characteristic, and a classification of animals which leaves it out is a one-sided classification.

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THE NATURALIST BRAZILIAN EXPEDITION.

BY HERBERT H. SMITH.

SECOND PAPER.—THE LOWER JACUHY AND SÃO JERONYMO.

(*Continued from page 716.*)

I WILL now describe the main geological features of the São Jeronymo district, which I studied carefully during several weeks, traversing all parts of it on foot or on horseback. My observations here extended over a space about forty miles long and twenty broad, comprehending the country south of the Jacuhy to the Serra do Herval, between the Arroio da Porteira on the west and the Arroio dos Ratos and Arroio da Divisa on the east.

I have stated that the hills generally trend east and west. Traveling southward from the Jacuhy, about forty miles, five main ridges are passed, each of which is successively higher than the preceding. The first, at its highest point, is about 600 feet